



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

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May 20, 2016

Paula Hamel  
Director, Generation & Electric Services  
Dominion Resources Services, Inc.  
5000 Dominion Boulevard  
Glen Allen, VA 23060

RE: Bremono Bluff Facility (SWP 618) Surface Impoundments Submittal 2<sup>nd</sup> Review

Dear Ms. Hamel:

The Virginia Department of Environmental Quality (DEQ) has reviewed the revised application materials provided by Dominion in accordance with the applicable provisions of the Virginia Solid Waste Management Regulations (VSWMR) and the EPA 2015 Final Rule on the Disposal of Coal Combustion Regulations (EPA Rule) and in response to the DEQ's review letter dated January 22, 2016.

### Closure Plan Drawings (Appendix B of the Closure Plan)

1. Drawings 8, 10, 14, and 16 identify the area at the northwestern end of the East Ash Pond as area to be clean closed, as discussed in Section 3.1 of the Closure Plan. From the drawings, it appears this area is delineated as wetlands and within the designated Resource Protection Area. Please indicate whether the appropriate permits or approvals are in place from the USACE or applicable agency for the construction and clean closure activities to take place in this area. Also, this area is identified within the text of the Closure Plan as the Stump Pond. Please label this area on all applicable drawings as the Stump Pond.
2. Drawing 15, 16, and 17 – Similar to the comment below on Drawing 16, please mark the required geomembrane penetrations for the existing microwave tower located on the bottom ash stockpile area top deck and existing transmission tower located in the south corner of the North Ash Pond.
3. Drawing 16 – It is unclear from this drawing and the referenced details whether the final cover geomembrane will be penetrated by the added 10' by 10' box culvert on the North Pond, the 24" culvert along the southside of the East Pond, and the identified toe drain outlets and manholes. If any penetrations are necessary for installation, please mark the required batten strips or geomembrane boots on the drawings.

4. Drawing 20 – The DEQ appreciates that a seepage barrier consisting of a 40mil HDPE liner was added to separate the East Ash Pond from the area to be clean closed and repurposed as a Stormwater Management Pond. However, it is suggested that the proposed seepage barrier be extended further down the toe of the excavated slope to contain the CCR within the East Ash Pond and at least extend 10 feet into the bottom of the soil fill. This extension will ensure no migration of constituents to the proposed Stormwater Management Pond.
5. Drawing 22 – It is indicated on Drawing 10 that the two toe drain outlets will remain and then on Drawing 16 two new manholes for the new gravity toe drain are identified at the existing outlet locations. Drawing 22 shows the alignment of the gravity toe drain and its profile. Please clarify the future of the existing toe drains and their outlets.
6. Drawing ESC-11 - This drawing is titled Interim Grading and Stormwater Management and divides the North and East Ash Ponds into Capping Phases, and only shows dewatering wells in the final capping phases. Please clarify whether dewatering wells will be used during each capping phase throughout the pond closure process and not just in the final capping phase.

Cap Drainage Calculations (Appendix D of the Closure Plan)

7. Section 3.1 – The calculation was completed for the slope of 2.2% for the North Ash Pond. Please also provide calculation for the 3:1 side slope.
8. Section 3.1 – The calculation was completed using a methodology proposed by Richardson, Giroud, & Zhao in a 2000 publication, *Design of Lateral Drainage Systems for Landfills*. This methodology assumes that the infiltration rate through the protective cover layer above the geocomposite is equal to the hydraulic conductivity of the protective cover layer. In the calculation, a value of  $8.84 \times 10^{-6}$  cm/s was used as the hydraulic conductivity of the protective cover layer. The value is relatively low and likely to be exceeded. If the material used for protective cover layer has a value of hydraulic conductivity greater than  $8.84 \times 10^{-6}$  cm/s, the infiltration rate will increase thus requiring a geocomposite with a higher transmissivity. To ensure the adequate performance of geocomposite as designed; the hydraulic conductivity of the protective cover layer should not exceed  $8.84 \times 10^{-6}$  cm/s. Therefore, the hydraulic conductivity of the protective cover material should be tested. Please add the hydraulic conductivity testing requirements, including frequency and testing conditions to Technical Specification Section 310000 Earthwork.
9. Attachment 1 – The attachment lists values of the reduction factors used in the calculation and the corresponding value range for each reduction factor recommended by the 2000 publication. Please explain the reason the lowest value in the recommended range of each reduction factor was used. Please note that the 2000 publication suggests a value of 6.0 for the combined drainage safety factor and reduction factors for similar landfill closures vs. the value of 2.73 ( $= 1.59 \times 1.3 \times 1.1 \times 1.0 \times 1.2$ ) used in the Attachment 1 calculation. In addition, since the transmissivity of the geocomposite was specified to be measured between two plates and under 15-minute seat time, the values of reduction factors used in the calculation are considered low.

Design Report Addendum (Appendix EA of the Closure Plan)

10. Attachment 2 – The seismic slope stability analyses were revised using PGA value obtained from 2014 Seismic Hazard map. By comparing the shear strengths of the materials used in the revised analyses (tabulated in the first page of Attachment 2) with those used in the previous analyses (summarized in Table 1 of Attachment 4 of the Appendix E), it appears that higher shear strengths were used in the revised analyses. Notably, the cohesions were increased from 50 psf to 75 psf. Please justify the use of the higher shear strengths in the revised analyses. In addition, DEQ suggests performing a sensitivity analysis using the cohesion of 50 psf to evaluate its effect on the estimated factor of safety.
11. Attachment 3 – In response to DEQ Comment, a veneer stability analysis under seismic force was provided. In addition, the previously submitted veneer stability analyses were also revised. By comparing the analyses in the previous and current submittals, it appears that the values of interface shear strength parameters used in the current submittal are higher than the previous submittal ( $\delta=28^\circ$  and  $C_a=50$  psf vs.  $\delta=24^\circ$  and  $C_a=0$  psf). Please revise the values of  $\delta$  and  $C_a$  in the main text of the closure plan (Section 3.3.3) and the technical specifications (Sections 310000.2.02.B and 310519.26.2.01C.1&2) to those used in the revised analyses.

Closure Cost Estimate (Appendix G of the Closure Plan)

12. The Closure Cost Estimates for the West Ash Pond and East Ash Pond clean closure areas were revised to include additional costs to cover the closure by removal demonstration; however, the costs were not updated to reflect the over-excavation by six inches of material underneath the estimated ash volume. Please address the additional six inches of material by including that volume in the material removal estimates (Miscellaneous item XII. Removal and Disposal of Stockpiled Material).
13. The Closure Cost Estimate for the East Ash Pond does not address the construction of the new dike with geomembrane barrier and related costs associated with constructing the seepage barrier between the East Ash Pond proposed Stormwater Management Pond. Please revise the appropriate sections of the cost estimate accordingly.
14. Once the cost estimates are revised accordingly, please provide another signed DEQ Form CE SWDF certifying the cost estimates provided are in accordance with 9 VAC 20-70.

Post-Closure Plan

15. Appendix A was not provided as part of the revised submittal. Please provide the revised post-closure care inspection checklist.
16. Please update the post-closure plan to reflect a 30 year post-closure care period and update the post-closure costs accordingly.
17. The post-closure cost estimate provided in Appendix B also includes reference pages to old DEQ Default Costs, which are no longer provided by the DEQ for cost estimate development. Please remove these pages from Appendix B and ensure that cost

factors used on DEQ Forms CEW-01 and CEW-02 are true cost estimates using today's dollars.

Groundwater Monitoring Plan (GMP)

18. Section 3.0 Site Geology and Hydrogeology – The site conceptual model in the Plan will need to be revised once additional wells are installed at the site. At least three geologic cross sections constructed using the new boring information shall be included as part of the site characterization and submitted with the final Plan revision.
19. Section 3.3.1.1 Water Supply Wells – The Plan notes that a low-capacity, non-potable supply well is located at the site. Information on the length of time the well has been in use, its average pumping rate, total depth and construction (if known) is crucial to help define the groundwater flow regime at the site. Information on the supply well must be provided in the Plan. The Department may require installation of groundwater piezometers around this well to define its zone of influence within the aquifer.
20. Section 3.3.2 Horizontal Component of Flow – The Plan must note which existing wells were used to calculate the gradient. The groundwater flow rate will need to be recalculated based on data obtained from the new wells installed at the site. The Department notes that calculation of groundwater gradients on site must be restricted to similar water bearing horizons. It is not appropriate to calculate a gradient combining data from bedrock groundwater elevations and “alluvium” groundwater elevations since the water bearing characteristics of each will be dissimilar.
21. Section 4.0 Design of the Groundwater Monitoring Network – The last sentence of Item #2 must remove “...., if any.” from the last sentence to “the earliest detection of groundwater contamination in the uppermost aquifer.”
22. Section 4.2 Monitoring Well Placement
  - Please note that based upon geologic data collected once groundwater monitoring wells are installed and monitored at the facility additional wells may be required as directed by the Department.
  - The proposed location of MW-24 should be moved closer to the boundary of the North Ash Pond to ensure that wells are located as close to the waste boundary as possible without being adversely affected by closure actions.
  - All compliance wells must, at a minimum, be installed with the top of the screened interval located below the base of each ash pond – and the entire length of the screen located below the water table. For ‘valley-fill’ design ash ponds, some select wells may be screened above the base of the former drainage valley, but still within the water table, to detect potential lateral dispersion of contaminants away from the ash pond.
  - As noted in DEQ’s first technical review (item #45), at least some of the point of compliance wells shall be installed as nested pairs. In the facility’s response, paired shallow and deep wells were proposed for MWs-25, 26, 27 and 29. The text does not clearly state that these four deeper wells will be part of the proposed compliance network and Drawings No. 2 and 3 show the deeper wells will be Proposed Groundwater Observation Wells. For lateral and vertical

characterization at the site, these paired deep bedrock wells must be included as part of the compliance monitoring network, and bedrock wells must be included in both the major geologic formations on site (i.e., Ordovician granite/volcanic rock and Devonian slate).

- A minimum of one shallow and deep well pair must be installed downgradient of the East Ash Pond to refine the vertical groundwater gradient for characterization at this area of the site.
- MWs should not be installed within the delineated 100-yr floodplain unless necessary. Those identified wells must have lateral protection including posts/bollards to avoid impact damage from rafted flood debris and must have a riser constructed at a finished elevation above the peak elevation of the 100-yr flood. Please note that if the riser for the groundwater monitoring well cannot be properly extended, additional action in event of a flood event that inundates wells within the network will require the facility to assess the impact of the flood water on the monitored aquifer within 90-days of flood water retreat or prior to the next scheduled groundwater compliance event. The VSWMR requires a monitoring system be capable of yielding representative samples of the underlying aquifer, and samples temporarily affected by flood waters may not meet this performance requirement. In this event, if a flood event impairment to the local aquifer is recognized, the Department must be notified within 7-days of this finding, and the owner/operator must request either a one-time extension to the groundwater sampling schedule using an appropriate mechanism to allow flood impact to mitigate, or replace the wells with deeper monitoring points which can act as compliance points until the flood impairment of the aquifer has ended and baseline conditions have returned. Please review the proposed groundwater monitoring wells in light of this information and requirement and adjust accordingly in the appropriate section of monitoring well location, construction and, in necessary, reflect these measures as proposed action in the Groundwater Monitoring Plan.

23. Section 4.2.1 Compliance Monitoring Network – MW-11, MW-29 and MW-30 are the proposed upgradient/background wells at the facility noted in the Plan:

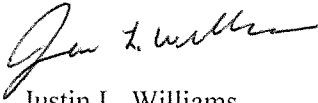
- MW-30's use as a property boundary sentinel well may be appropriate but another monitoring well should be identified for use as an upgradient/background well. Also, please explore and provide a response on the ability to install a well pair at the northwest corner of the facility to act as a background well in the Devonian bedrock in lieu of specified location of MW-30.
- MW-11 is installed to a depth of 49 feet below ground surface and is not screened into bedrock or finished to a depth below the base of the North Ash Pond. These factors make the well an inadequate background monitoring point. A replacement well with a paired deeper well shall be installed. Revise the monitoring network accordingly.
- MW-1 is not listed in the proposed compliance monitoring network. If MW-1 is to be dropped from the network, the Plan must explain why. Please clarify the status of MW-1 in the Plan and revise accordingly particularly as the tables identifying groundwater monitoring wells does not identify this well as being abandoned.

- Based upon the above comments regarding identified background/upgradient wells, please identify an appropriate number of background/upgradient wells for the facility.
24. Section 4.3 Monitoring Well Construction – The table lists an 80 day installation timeframe for MW-19, but the text and the response letter note 90 days. Please revise the Table accordingly.
25. Section 4.5– Well Operations and Maintenance – This section of the Plan must describe the activities that will be put in place to maintain the wells and ensure the long term performance of the monitoring network (i.e., mowing grass, concrete pylons around well, protection from surface water infiltration and flooding, etc.) and also include data that will be used to evaluate when wells may need replacement or repairs (i.e., repeatedly dry, damage to well casing, excessive sediment, etc.). If any wells are located within the 100-yr floodplain, the Plan must describe what actions will be taken post flood inundation to determine if the well(s) can remain as groundwater compliance points.
26. Section 5.2.5 Groundwater Protection Standards – The Plan must be revised to note that risk-based Alternate Concentration Limits (ACLs) defined in the VSWMR will not be used as GPS. Also, please clarify between this section and Table 4 regarding constituents for which a GPS will be established. Please note that any EPA Appendix IV constituent and any VSWMR metal must have a GPS established and that GPS can only be a MCL or Background-based. This may be accomplished through a presentation of two separate tables, one identifying monitoring constituents and the other identifying those constituents with a required GPS.
27. Sections 5.2.6.1 and 5.2.6.2 Semi-Annual and Annual Reports – Reporting must follow existing DEQ Submission Instructions (SI) and reporting formats.
28. Section 6.9.3 Limits of Quantitation – As noted in DEQ’s first technical review (item #58), the laboratory limit of quantitation (LOQ) must be equivalent or equal to the constituent’s Groundwater Protection Standard (GPS). The facility’s response noted that while the goal is to use methods with LOQs that are less than GPS, it may not be feasible. All laboratories must be able to meet MCLs and utilize an LOQ below the GPS established for the list of sampling parameters.
29. Tables 3 and 4 – The Notes column in each Table states that many of the metals constituents “will have a background based GPS”. The text should be revised to “proposed background-based GPS upon approval by DEQ”. Also, Boron will be considered an Assessment Monitoring constituent and therefore a “proposed background-based GPS upon approval by DEQ” will be required. Additionally, please include a notation and within the plan that chromium must be sampled, monitored, and reported for both total and hexavalent chromium and then compared for the MCL GPS for chromium.
30. Drawings 2 and 3 –Please remove the approximate and inferred contour lines.

31. Appendix C Well Construction Specifics – The procedures do not describe site-specific details. For example, in Section 3.5, the surface completion information describes both manhole completion and stickup installations. The Plan must describe which completion method will be used at the site and include a discussion on requirements necessary for the surface completions (height of risers) and impact protections (bollards/posts) at all wells located within the 100 year floodplain.

Please provide the additional information and necessary revisions. Please note that this letter should not be considered a legal opinion or a case decision as defined by the Administrative Process Act, Code of Virginia § 2.2-4000 et seq. If there are any questions about this letter, please contact me at (804)-698-4185 or [Justin.Williams@deq.virginia.gov](mailto:Justin.Williams@deq.virginia.gov).

Respectfully,



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Land Protection & Revitalization Division Director

cc: Graham Simmerman, VRO Regional Land Protection Program Manager  
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